



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,971	10/22/2001	Kenji Ukai	04917.0096	8551

7590 11/18/2003

Finnegan, Henderson, Farabow,  
Garrett & Dunner, L.L.P.  
1300 I Street, N.W.  
Washington, DC 20005-3315

EXAMINER
----------

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/982,971

Applicant(s)

UKAI ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Art Unit: 1745

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

The information disclosure statements (IDS) submitted on 1/22/02 and 2/14/02 have been considered by the examiner.

### ***Claims Analysis***

Claims 3-5 recite the phrase “less than or equal to”, which can be interpreted as a range including zero or a range excluding zero. See MPEP 2173.05. If Applicant intended to claim a range excluding zero, Examiner suggests the claims be amended to recite “greater than zero and less than or equal to”.

Both possible interpretations of the ranges of claims 3-5 will be addressed. Specifically, if the ranges of claims 3-5 are interpreted as including zero, the claims are anticipated by the prior art (see 102(b) rejection of claims 1-5 below). If the ranges of claims 3-5 are interpreted as excluding zero, the claims are obvious in view of the prior art (see 103(a) rejection of claims 3-5 below).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 1745

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Mizutani et al., JP 07-006768.

Mizutani teaches a nickel-scandium stabilized zirconia cermet (Ni-ScSZ) fuel electrode for a solid electrolyte fuel cell. One surface of a solid electrolyte plate in the self-standing flat plate type solid electrolyte fuel cell is coated with a fuel electrode which is a cermet material of metal nickel (catalyst) and scandium stabilized zirconia (second electrolyte) material (abstract). The solid electrolyte plate may be a yttria stabilized zirconia (YSZ) or a scandia stabilized zirconia (ScSZ) material (0013). Figure 4 shows the relationship between conductivity at 1000°C and the mole percent of scandia in the ScSZ fuel electrode (0023-0026). Figure 4 shows that when the mole percent of scandia in the ScSZ electrolyte material of the fuel electrode is between 8-12 mol% the conductivity is greater than 0.2 S/cm at 1000°C.

Thus the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3-5 are rejected under 35 U.S.C 103(a) as being unpatentable over Mizutani et al., JP 07-006768 in view of Mizutani et al., JP 2000-340240.

Mizutani '768 teaches a nickel-scandium stabilized zirconia cermet (Ni-ScSZ) fuel electrode for a solid electrolyte fuel cell. One surface of a solid electrolyte plate in the self-standing flat plate type solid electrolyte fuel cell is coated with a fuel electrode which is a cermet

Art Unit: 1745

material of metal nickel (catalyst) and scandium stabilized zirconia (second electrolyte) material (abstract). The solid electrolyte plate may be a yttria stabilized zirconia (YSZ) or a scandia stabilized zirconia (ScSZ) material (0013). Figure 4 shows the relationship between conductivity at 1000°C and the mole percent of scandia in the ScSZ fuel electrode (0023-0026). Figure 4 shows that when the mole percent of scandia in the ScSZ electrolyte material of the fuel electrode is between 8-12 mol% the conductivity is greater than 0.2 S/cm at 1000°C.

Mizutani '768 does not explicitly state that the ScSZ additionally contains yttria, ceria or alumina.

However, Mizutani '240 teaches a solid electrolyte material for a solid electrolyte fuel cell wherein a fuel electrode is formed on one side of the solid electrolyte and an oxygen electrode is formed on the opposite side of the solid electrolyte. The solid electrolyte material comprises zirconia as a main component wherein scandia of 5-15 mol% and one or more than two kinds of other rare earth oxides of 0.5-5 mol% are mixed and dissolved. Scandia and rare earth oxide are mixed so that the total mixing quantity is in the range of 9-15 mol%. The rare earth oxides may be ceria ( $\text{CeO}_2$ ) or yttria ( $\text{Y}_2\text{O}_3$ ). The electrolyte material has high oxygen ion conductivity and high strength by adding the rare earth oxide to scandia-stabilized zirconia (abstract). Table 1 discloses an electrolyte material of scandia-ceria-stabilized zirconia having 10 mol% of scandia and 1 mol% of ceria (10Sc1CeSZ) with an ion conductivity of 0.31 S/cm at 1000°C. Table 1 further discloses an electrolyte material of scandia-stabilized zirconia having 11 mol% of scandia with 1 wt% of alumina added (11ScSZ1A) with an ion conductivity of 0.27 S/cm at 1000°C (0006). Table 3 shows an example of scandia-yttria-stabilized zirconia (10Sc1YSZ) with an ion conductivity of 0.265-0.269 S/cm at 1000°C.

Art Unit: 1745

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the electrolyte material of the solid electrolyte of Mizutani '240 for the electrolyte material of the fuel electrode of Mizutani '768 in order to increase the ion conductivity and strength of the fuel electrode (Table 1). Mizutani '240 teaches adding yttria, ceria or alumina to a scandia-stabilized zirconia electrolyte material increases ion conductivity and the strength of the electrolyte material. One of skill would have known that the same electrolyte materials used for the solid electrolyte of a solid oxide fuel cell could have been used for the electrolyte material of the cermet comprising the fuel electrode. This is shown by Mizutani '768 that discloses a solid electrolyte fuel cell having a fuel electrode of a cermet material comprising nickel (catalyst)-scandium stabilized zirconia (electrolyte) and a solid electrolyte of scandium stabilized zirconia (abstract). Mizutani '768 teaches that the same electrolyte material may be used for both the solid electrolyte and the fuel electrode of a solid oxide fuel cell.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Maskalick teaches fuel electrodes having nickel metal particles (catalyst) dispersed through zirconia stabilized in cubic form. Typical stabilizers include yttria, calcia, magnesia and scandia. About 7 to about 13 mol% of the stabilizer is added to the zirconia to stabilize it in cubic form.

Art Unit: 1745

Badding teaches fuel electrode materials include cermet materials with 1-40% inert phase such as nickel/yttria stabilized zirconia cermet and noble metal/yttria stabilized zirconia cermet (col. 6, lines 45-54).

Wallin 5,670,270 teaches solid oxide fuel cells having ionically conductive material with sufficient ionic conductivity of greater than or equal to  $10^{-3}$  S/cm at the operating temperature of the fuel cell (col. 4, lines 23-40).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).



Tracy Dove  
Patent Examiner  
Technology Center 1700  
Art Unit 1745

November 3, 2003